

CLAIMS

1. A plasma display panel comprising a front substrate and a back substrate that face each other with a space therebetween, the front panel having a plurality of electrodes disposed on a main surface thereof, and a dielectric film and a protective film formed sequentially to cover the electrodes, and luminescent display being performed by applying a voltage to the electrodes to cause a discharge in the space between the substrates,
5 characterized in that:
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a plurality of needle crystals composed of a conductive substance or a semiconductor substance are disposed to penetrate at least one of the dielectric film and the protective film in a thickness direction.

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2. The plasma display panel of claim 1, wherein the needle crystals are disposed substantially perpendicular to the main surface of the front substrate to penetrate the protective film in a thickness direction, and a material of
20 the protective film is layered to completely fill gaps between the needle crystals.

25 3. The plasma display panel of claim 2, wherein the protective film material and the needle crystals form a phase-separated structure.

4. The plasma display panel of claim 2, wherein the needle crystals are graphite crystals.

5. The plasma display panel of claim 4, wherein a metal layer composed of one or a plurality of metals selected from the group consisting of iron, cobalt, and nickel is
5 interposed between the dielectric film and the needle crystals.

6. The plasma display panel of claim 4, wherein the graphite crystals are one member selected from the group
10 consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon.

7. The plasma display panel of claim 2, wherein the needle crystals are tetrapod-shaped particles.

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8. The plasma display panel of claim 7, wherein the particles are composed of zinc oxide.

9. The plasma display panel of claim 2, wherein tips
20 of the needle crystals are exposed above the surface of the protective film.

10. The plasma display panel of claim 2, wherein tips of the needle crystals are buried in the protective film.

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11. The plasma display panel of claim 1, wherein the needle crystals are disposed substantially perpendicular to the main surface of the front substrate to penetrate the

dielectric film in a thickness direction, and a material of the dielectric film and a material of the protective film are layered to completely fill gaps between the needle crystals.

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12. The plasma display panel of claim 11, wherein the dielectric film material and the needle crystals form a phase-separated structure.

10 13. The plasma display panel of claim 11, wherein the needle crystals are graphite crystals.

14. The plasma display panel of claim 13, wherein a metal layer composed of one or a plurality of metals selected 15 from the group consisting of iron, cobalt, and nickel is interposed between the electrodes and the needle crystals.

15. The plasma display panel of claim 13, wherein the graphite crystals are one member selected from the group 20 consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon.

16. The plasma display panel of claim 11, wherein the needle crystals are tetrapod-shaped particles.

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17. The plasma display panel of claim 16, wherein the particles are composed of zinc oxide.

18. The plasma display panel of claim 11, wherein tips of the needle crystals are exposed above the surface of the protective film.

5 19. The plasma display panel of claim 11, wherein tips of the needle crystals are buried in the protective film.

20. The plasma display panel of claim 11, wherein
the electrodes include a display electrode pair,
10 and

the needle crystals are disposed on one or both
of the display electrodes in the pair.

21. The plasma display panel of claim 11, wherein
15 the electrodes include a display electrode pair,
and an electron emitting electrode formed between the display
electrodes in the pair, and

the needle crystals are disposed on the electron
emitting electrode.

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22. The plasma display panel of claim 21, wherein when
generating a sustain discharge in the space between the
substrates, a sustain voltage is applied to the display
electrodes, while holding the electron emitting electrode
25 at one of ground potential and floating potential.

23. The plasma display panel as in any of claims 1
to 22, wherein the protective film is composed of one or a

compound of metal oxides selected from the group consisting of magnesium oxide, calcium oxide, strontium oxide, and barium oxide.